



# An Analysis of Alfalfa Harvest Costs: Implications for Custom Harvest Charges

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## Study Objectives

- Estimate alfalfa harvest costs with various equipment combinations
- Compare swathing with a cutterbar versus a rotary mower
- Compare large bales with small bales
- Estimate change in costs at differing yields
- Estimate change in costs from increasing the number of cuttings



## Data Sources

- American Society of Agricultural Engineers
  - Equipment hours of life
  - Equipment speed
  - Equipment repair costs
  - Equipment fuel use
- Equipment Prices
  - Equipment dealers, Northern CA and OR
- Custom Harvest Operators
  - Hours per acre at varying yields

# Equipment Use by Operation

Operation	Equipment	Equipment
1a. Swath	Swather – 126 HP	Cutterbar header
1b. Swath	Swather – 186 HP	Rotary cutter header
2. Rake	Tractor – 62 HP	Rake – 27' center delivery
3a. Bale small bales	Tractor – 62 HP	Small bale baler
3b. Bale large bales	Tractor – 145 HP	Large bale baler
4a. Roadside small bales	Balewagon	
4b. Roadside large bales	Balewagon	Large bale pickup attachment



## Equipment Costs

- Overhead (Annual Ownership)
  - Capital recovery (principle and interest)
  - Insurance
  - Taxes
- Operating Costs (Hourly)
  - Repairs
  - Fuel and Lube
  - Labor

## Cost per Acre by Operation\*

Operation	Acres/ Hour	\$/ Hour	\$/Acre
1a. Swath - cutterbar	6	\$62.10	\$10.56
1b. Swath - rotary	13	88.75	7.01
2. Rake	13	42.77	3.25
3a. Bale small bales	7	65.73	10.05
3b. Bale large bales	10	78.79	8.04
4a. Roadside small	5	99.45	19.50
4b. Roadside large bales	8	107.25	14.02

\* Includes labor, equipment overhead, and operating costs



## Factors Influencing Speed

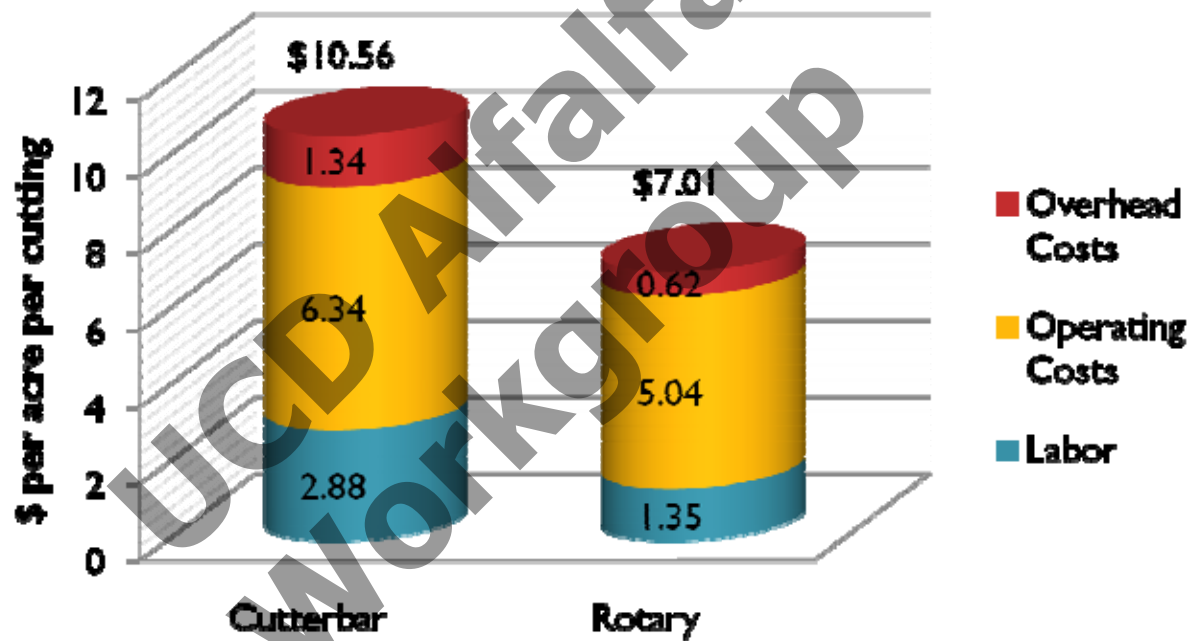
- Equipment capabilities
- Condition of the field (e.g. gopher holes)
- Size and shape of the field (number of turns)
- Operator skill



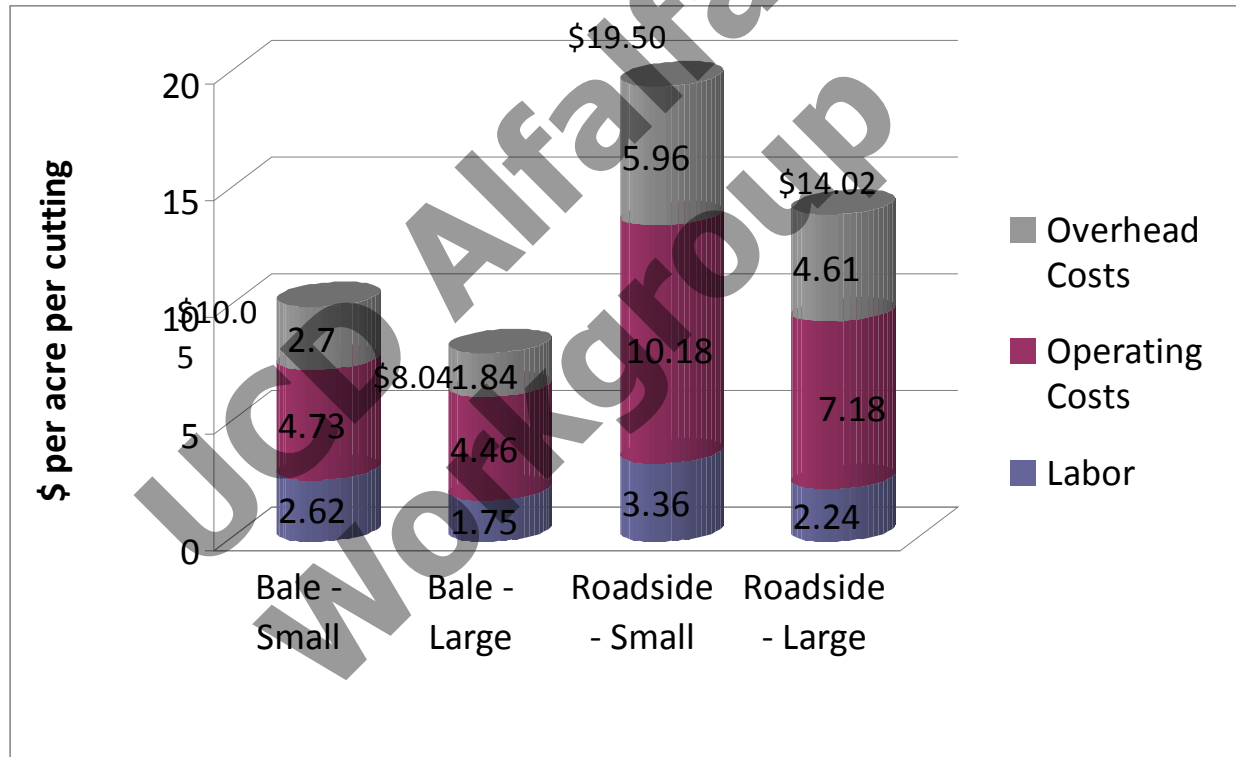
# Harvest Equipment Options

Bale Size	Swath Type
1. Small Bale	Swath - Cutterbar
2. Small Bale	Swath – Rotary Cutter
3. Large Bale	Swath - Cutterbar
4. Large Bale	Swath – Rotary Cutter

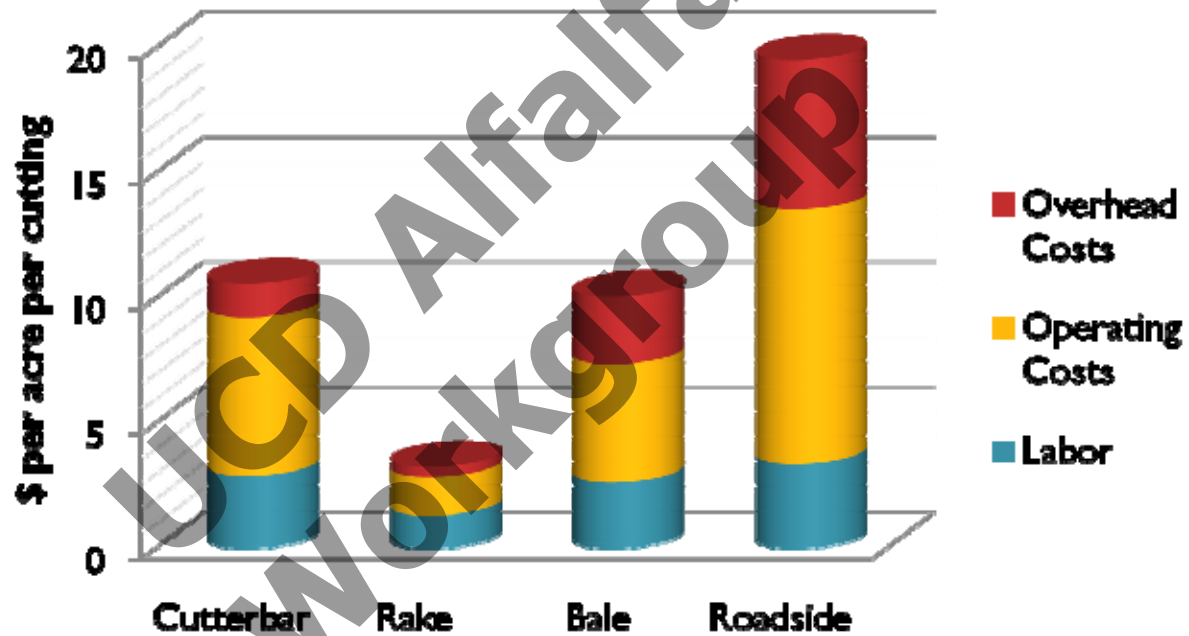
# Cost to Swath Cutterbar vs. Rotary



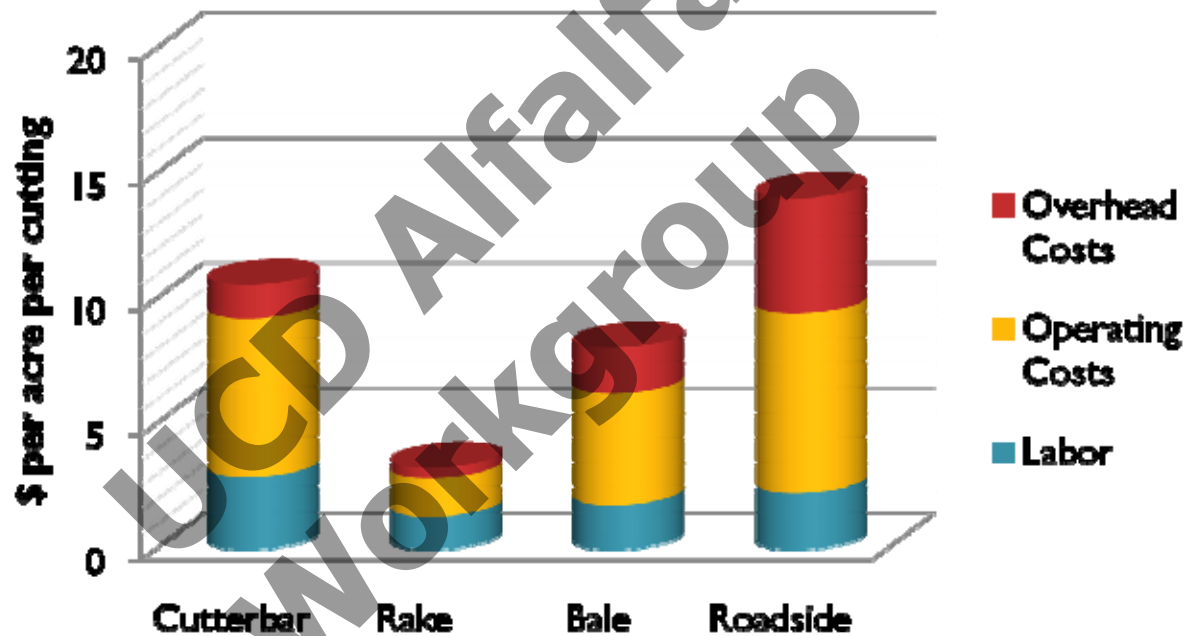
# Costs to Bale and Roadside Small Bales vs. Large Bales



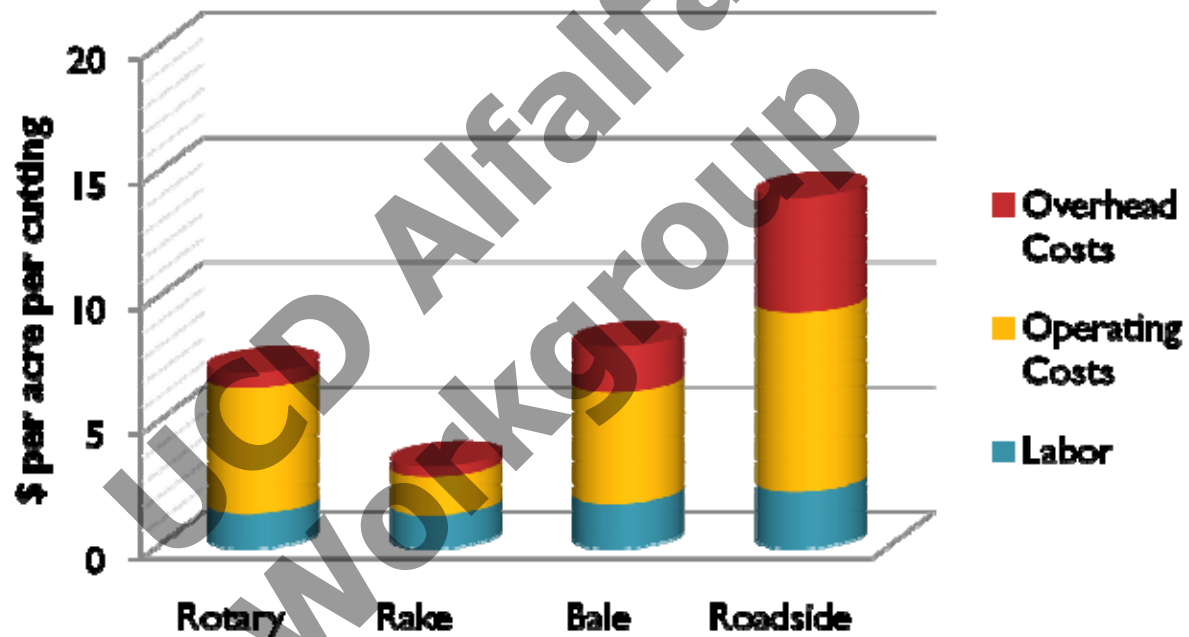
# Harvest Costs – Small Bales \$43.35/Acre/Cutting



## Harvest Costs – Large Bales & Cutterbar \$35.87/Acre/Cutting



# Harvest Costs – Large Bales, Rotary \$32.34/Acre/Cutting



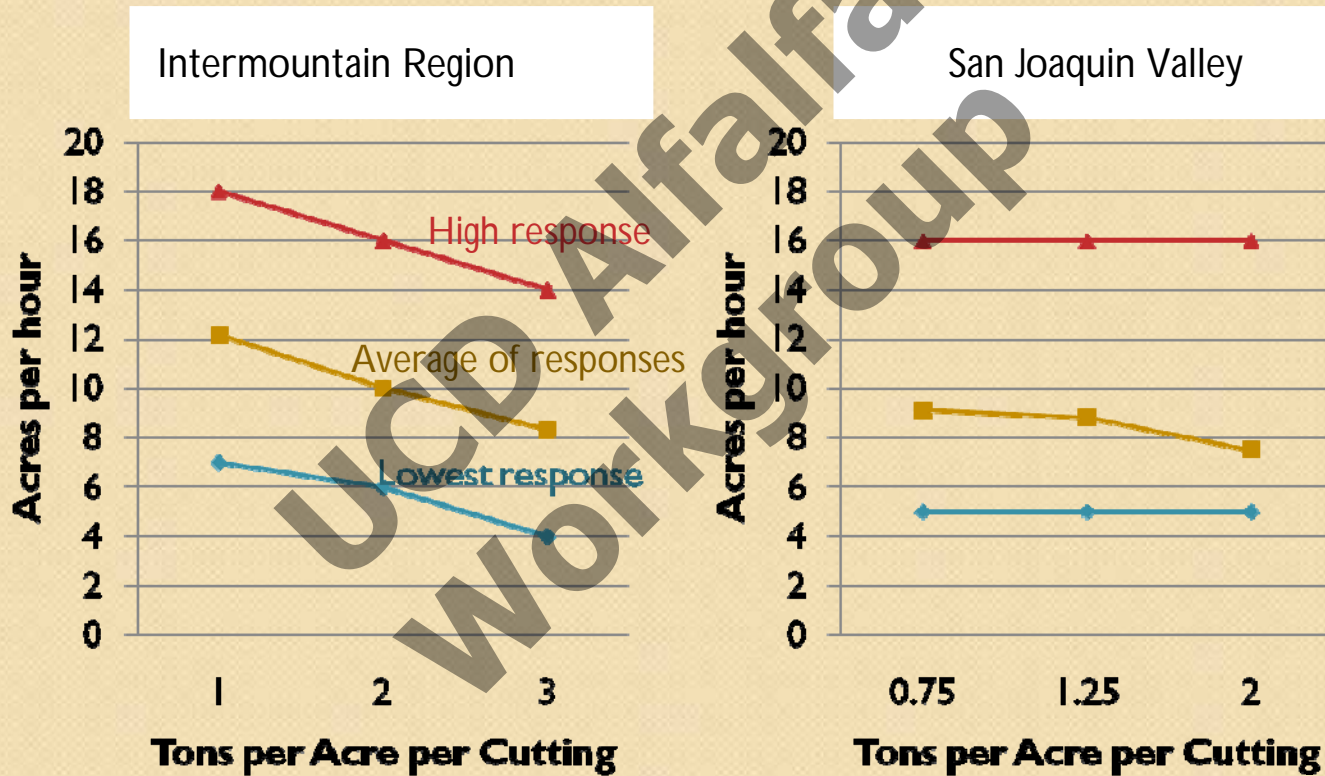


## Variation in Harvest Operation Time at Varying Yields – Acres per Hour

### Survey Results from Custom Operators

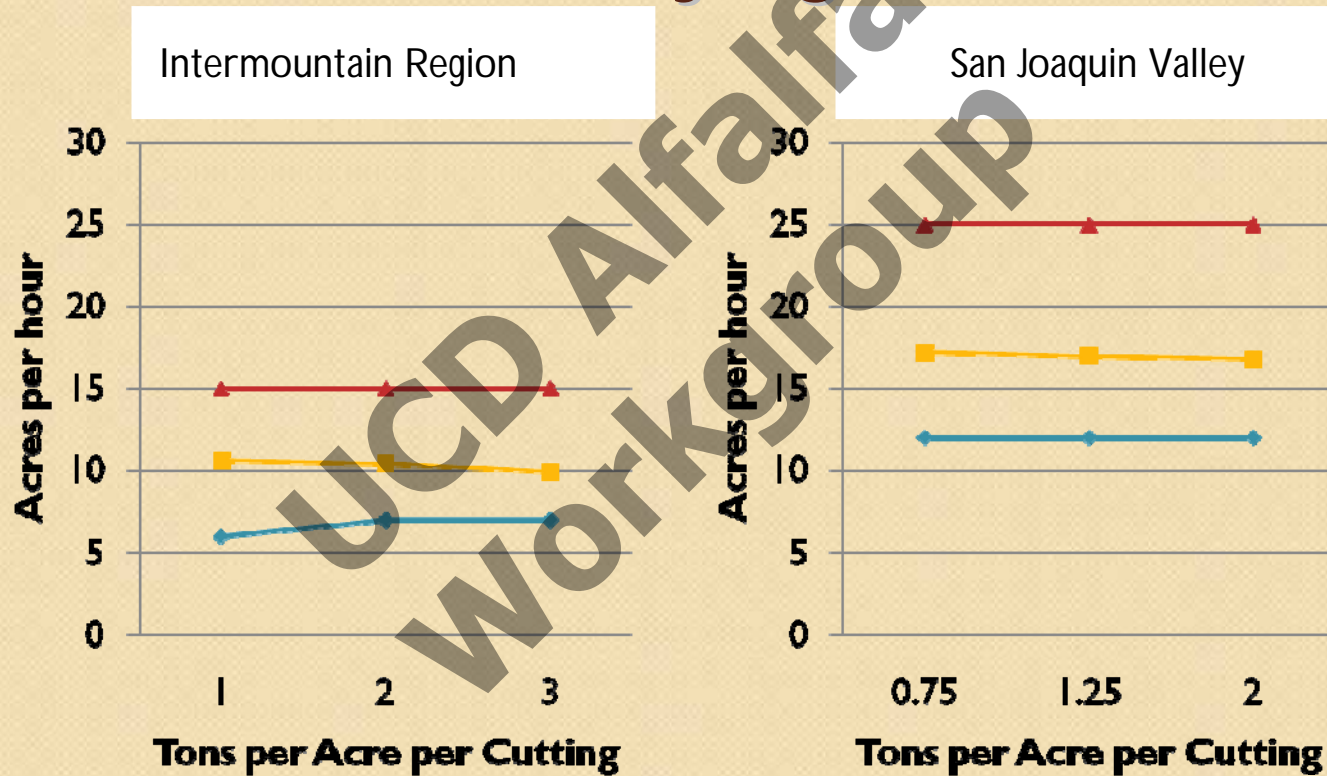
- Intermountain Region N=5
- San Joaquin Valley N=10
- Highest, average, and lowest values reported

# Variation in Time per Acre for Swathing at Varying Yield

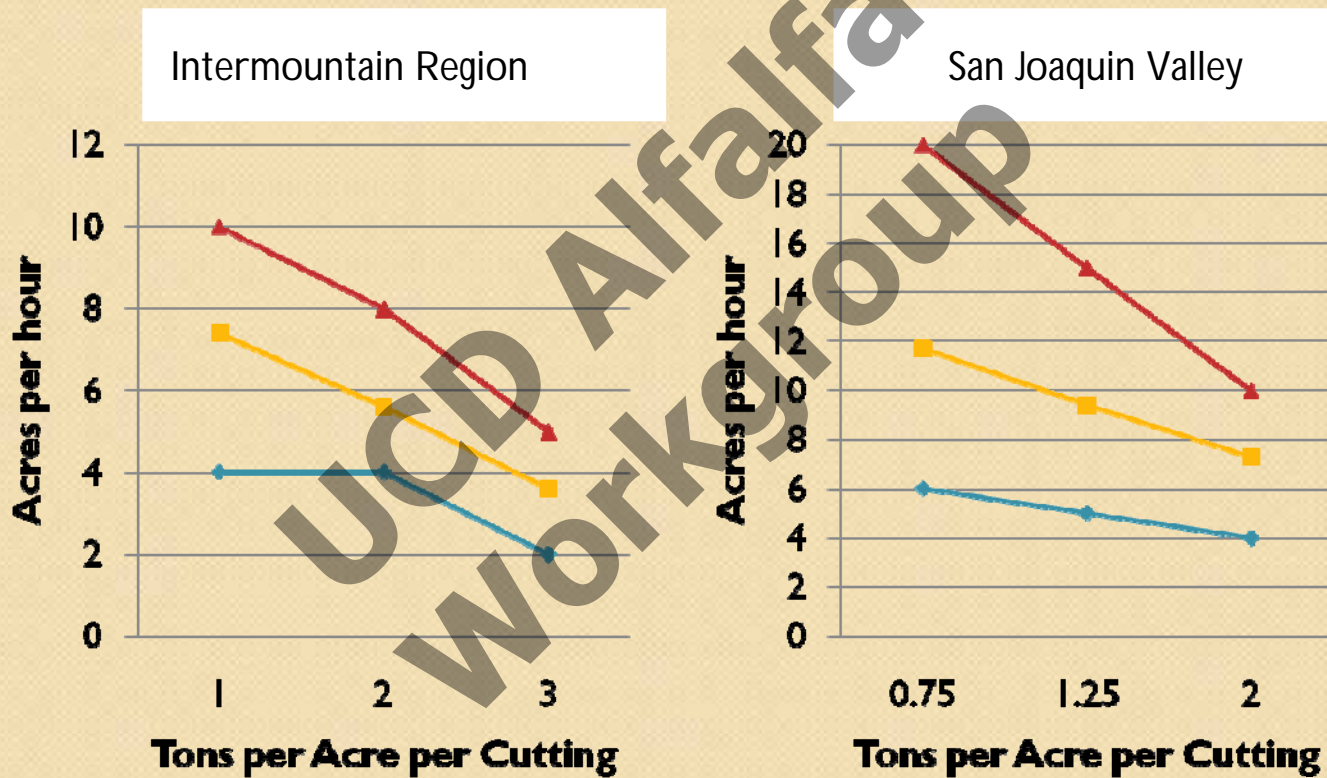




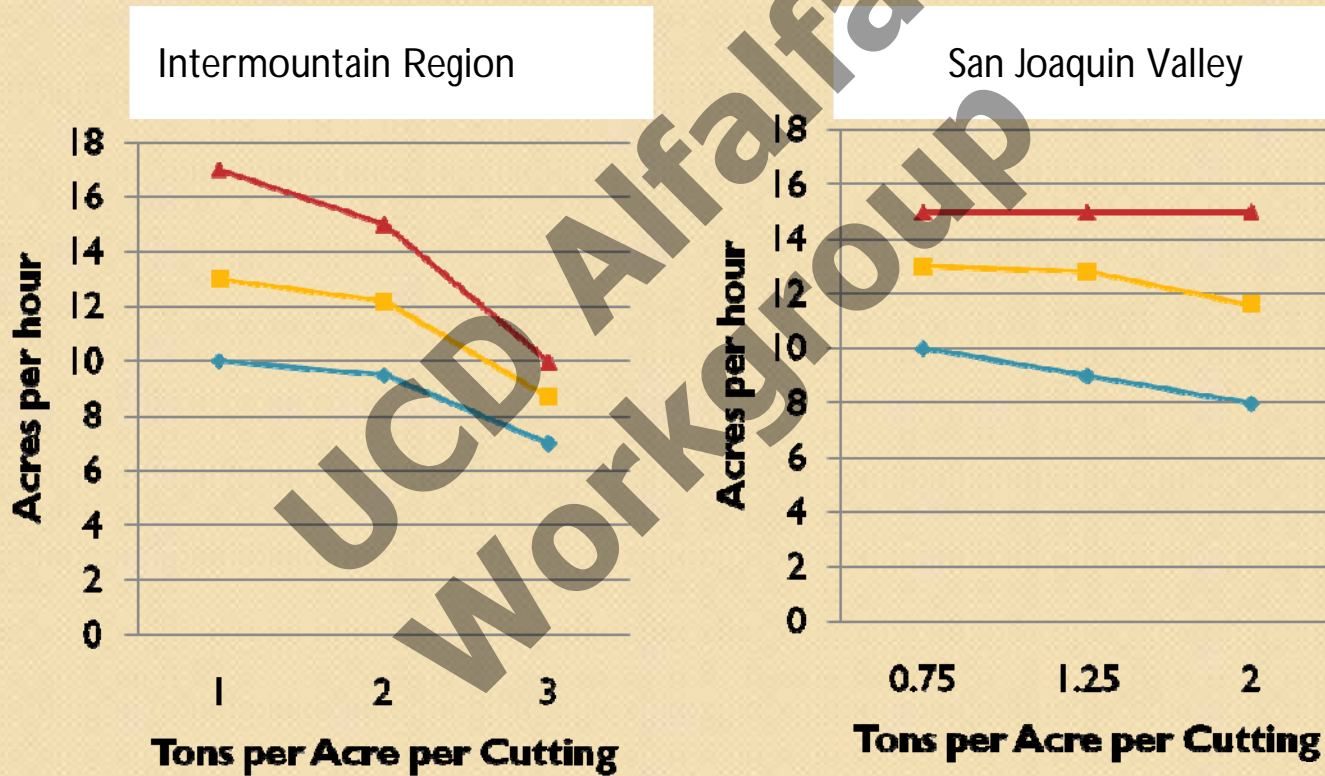
# Variation in Time per Acre for Rake at Varying Yield



# Variation in Time per Acre for Baling (Small) at Varying Yield

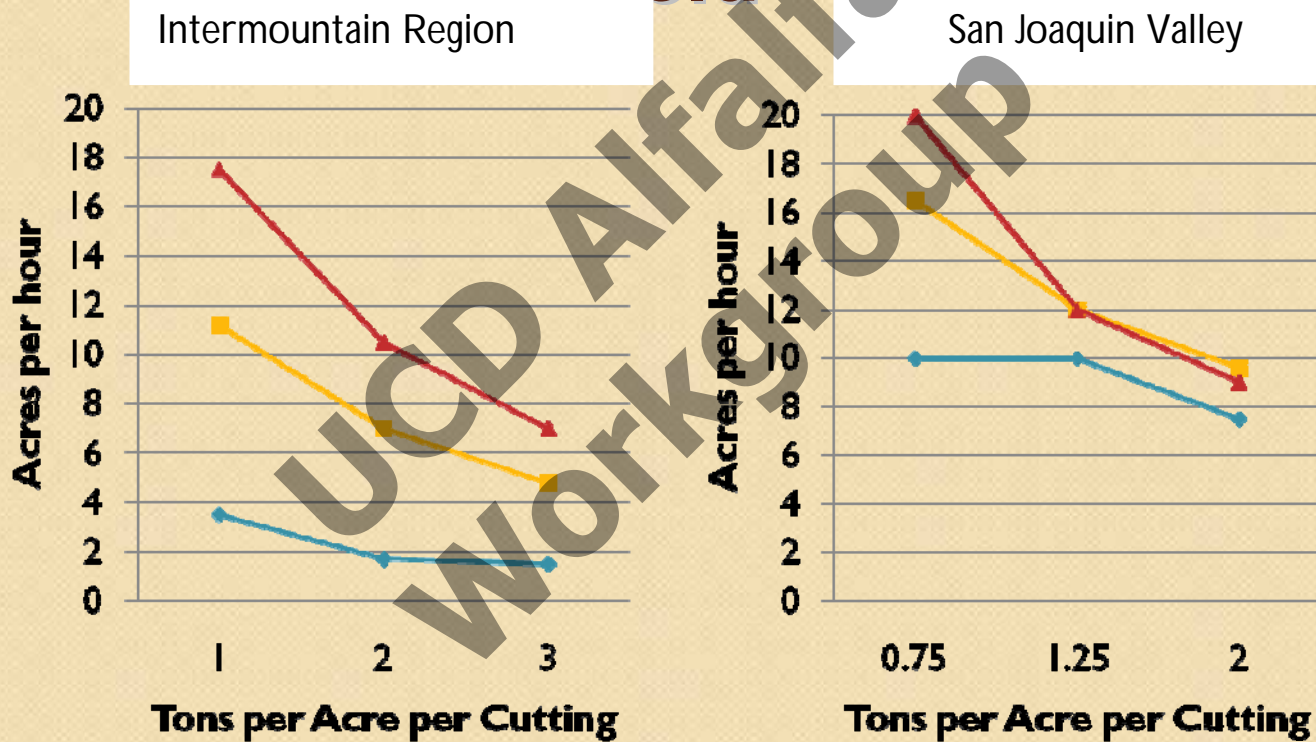


# Variation in Time per Acre for Baling (Large) at Varying Yield

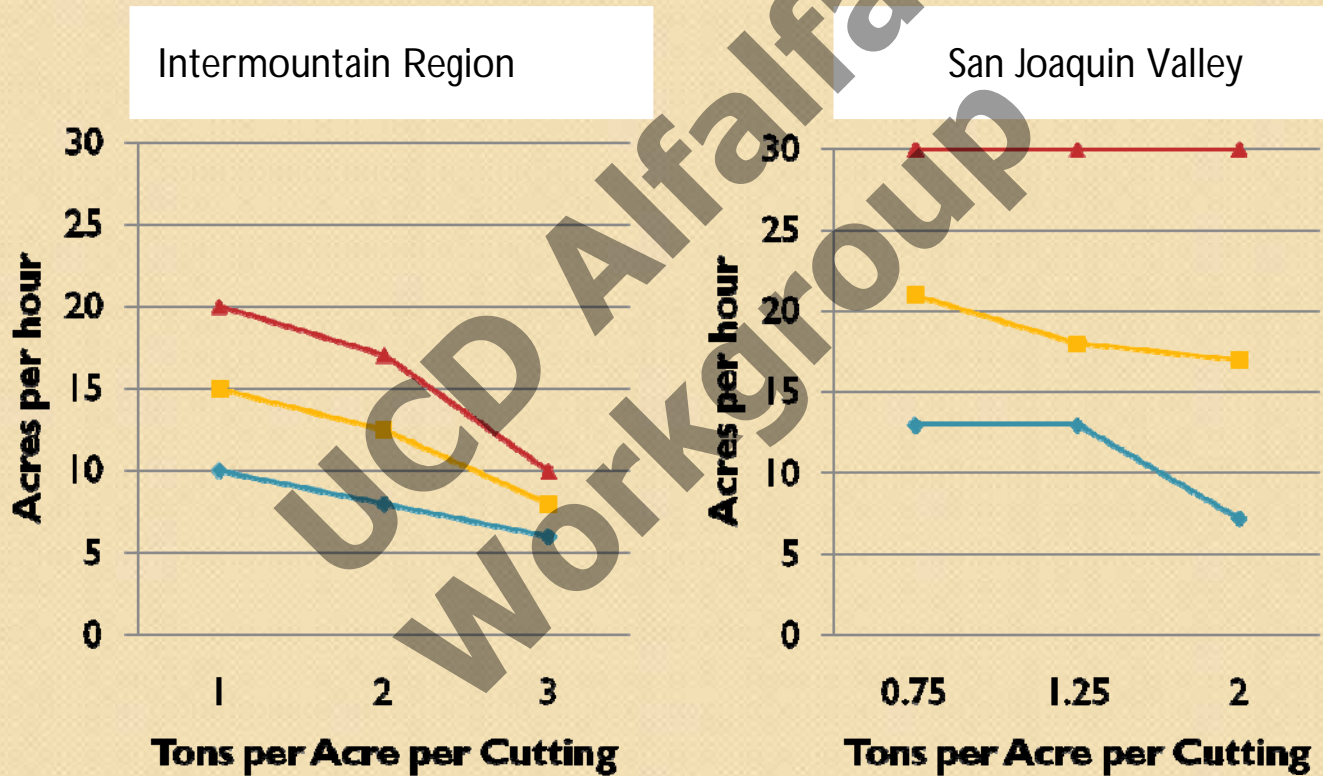




# Variation in Time per Acre for Roadside (Small) at Varying Yield



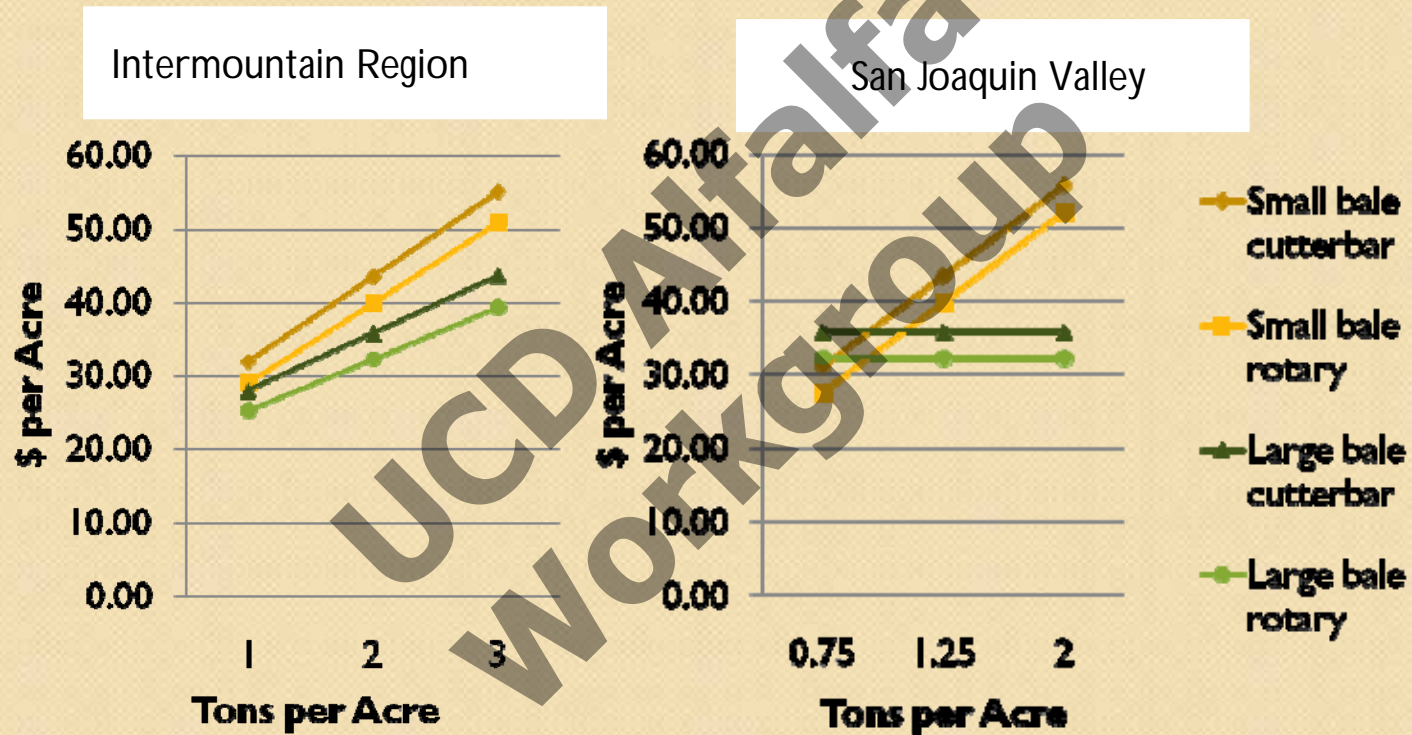
## Variation in Time per Acre for Roadside (Large) at Varying Yield



# Harvest Operation Time by Yield Survey Results

Operation	% change in time/ change in yield	
	San Joaquin Valley	Intermountain
Swath	None	20%
Rake	None	None
Bale - Small bales	25%	30%
Bale - Large bales	None	27%
Roadside – Small bales	50%	33%
Roadside – Large bales	None	25%

# Cost per Cutting at Varying Yield



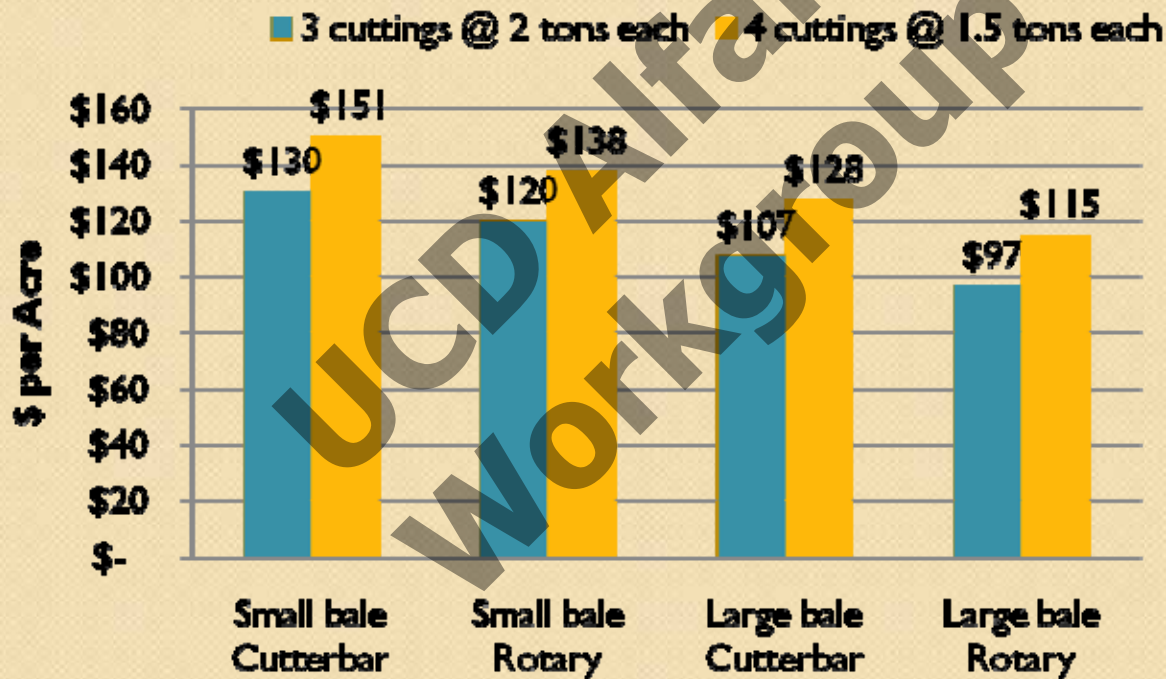


## Comparison of Harvest Costs per Acre Varying Number of Cuttings

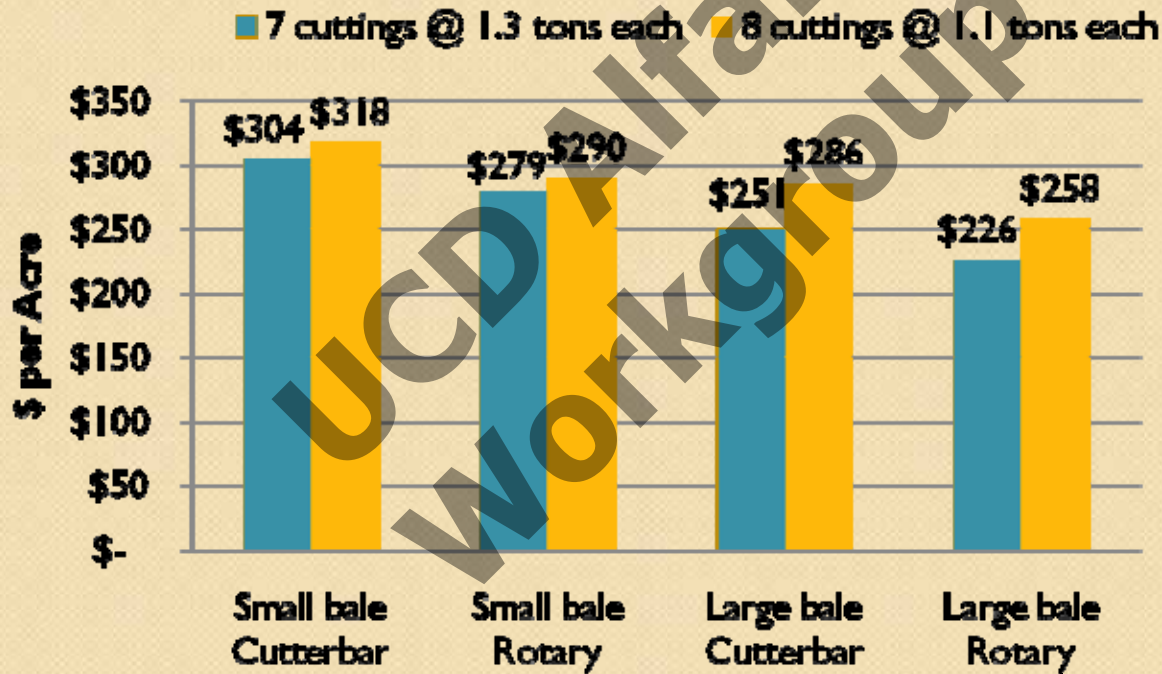
- Intermountain Region – 6 tons/acre/year
  - 3 cuttings – 2 tons per cutting
  - 4 cuttings – 1.5 tons per cutting
- San Joaquin Valley – 9 tons/acre/year
  - 7 cuttings – 1.25 tons per cutting
  - 8 cuttings – 1.1 tons per cutting



# Intermountain Region Cost Per Acre 3 vs. 4 Cuttings 6 Tons per Acre per Year Held Constant



# San Joaquin Valley Cost Per Acre 7 vs. 8 Cuttings 9 Tons per Acre per Year Held Constant





## Take Home Ideas

- The rotary mower costs less per cutting than the cutterbar type
  - despite increased purchase cost and horsepower requirements
  - due to greater speed.
- Large bales cost less to bale and roadside per cutting than small bales
  - despite increased purchase cost and horsepower requirements
  - due to greater speed.



## Impact of Yield on Hours per Acre

- All growers said that there was no impact on raking time.
- Some growers noted a large effect for the remaining harvest operations (swath, bale, and roadside) and other growers did not.
- IM growers indicated larger yield effects than SJV growers.
- The impact was greater for small bales than large bales.



## Impact of Number of Cuttings on Total Harvest Cost per Acre

- Increasing the number of cuttings by one and holding the total yield constant, the cost per cutting decreases but the cost per acre increases.
- The increase in cost is greater for large bales than small bales because there is less savings from a lower yield per cutting.
- The difference in cost per acre is greater in the IM region than the SJV because one cutting is a 33% increase for the IM and only a 14% increase in the number of SJV cuttings.



## Impact of Number of Cuttings on Total Harvest Cost per Acre

- Increase in the number of cuttings needs to be justified by an increase in the quality and/or the price of the hay cut on a shorter schedule to be profitable.